What is the magnifying power of convex lens of power 40 diopter when used as a magnifying glass?

Answer

By definition, optical power $D = 40 \; dioptre = \frac{1}{F}$, where F is a focal length of the lens.

Thin lens equation:

$$D = \frac{1}{F} = \frac{1}{a} + \frac{1}{b} \; ,$$

where $a = OA$ is the distance from the lens to the object and $b = OB$ is the distance from the lens to the image.
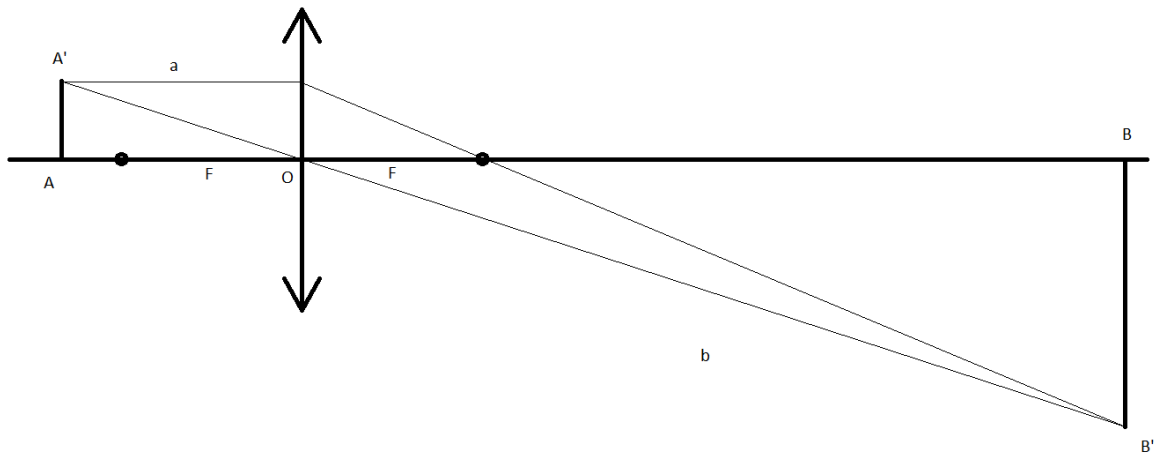

Fig. 1. Scheme of convex lens

The magnification is

$$m = \frac{BB'}{AA'} = \frac{OB}{OA} = \frac{b}{a} \; ,$$

where we use similarity of triangles OAA' and OBB'. Multiplying the first equation by a we obtain

$$aD = 1 + \frac{a}{b} \Rightarrow \frac{b}{a} = \frac{1}{aD - 1}.$$

Thus, the magnification of lens is

$$m = \frac{1}{aD - 1}.$$

For the final answer we need to know the distance a between lens and object.